

REMARKS

Favorable reconsideration of this application, in light of the following discussion and in view of the present amendment, is respectfully requested.

Claims 1 and 4 are amended. Claims 1-20 are pending in the application.

I. Rejection under 35 U.S.C. § 102

In the Office Action, at page 2, claims 1-20 were rejected under 35 U.S.C. § 102(b) as being unpatentable over U.S. Patent No. 4,456,870 to Bulgrin. This rejection is respectfully traversed because Bulgrin does not discuss or suggest:

detecting means for detecting a rate of heat generation per unit time by the heater in the metering process;

storing means for storing the rate of heat generation by the heater with elapsing time in the metering process; and

display means for displaying the stored rate of heat generation by the heater with the elapsing time in the metering process in a form of a graph,

whereby shearing heat of resin generated by the rotating screw in the metering process is monitored,

as recited in independent claim 1.

As a non-limiting example, the present invention as set forth in claim 1, for example, is directed to a monitoring device for an injection molding machine. The metering process for the machine is performed by retracting a screw while controlling the temperature of the injection cylinder to be a set temperature. The monitoring device includes a detecting means detecting a rate of heat generation per unit time and a storing means for storing the rate of heat generation with elapsing time in the metering process. The device displays the stored rate of heat generation with the elapsing time in a form of a graph. Therefore, the shearing heat of resin generated by the rotating screw in the metering process is monitored.

Bulgrin discusses a barrel temperature state controller for an injection molding machine in which the state controller regulates the temperature of the barrel by dividing the temperature of the barrel into zones and layers, calculating the effects of heat transfer between all the layers in the zones for a set time to determine the heat needed to reach the operator set point temperature. Then the duty cycle for the heater bands is set to control the temperature. Bulgrin discusses determining the future temperature for specific layers by calculating heat transfer to and from layers in each zone during a future time period. Bulgrin discusses maintaining a set

point temperature of the barrel by automatically controlling the duty cycle for the heater bands using the determined future temperature. Bulgrin does not discuss or suggest that, in the metering process, the rate of heat generation by the heater per unit time is detected and stored with elapsing time. Bulgrin merely discusses determining temperature changes for each layer using heat transfer calculations, but does not discuss or suggest that the rate of heat generation by the a heater is determined per unit time and stored with the elapsing time during this metering process.

Further, while Bulgrin discusses an operator console screen 28 having set point signals for dialing in desired temperatures for zones which are inputted to a temperature card 65 though an interface card 61, Bulgrin includes no discussion of displaying the stored rate of heat generation in the metering process by the heater on this display with the elapsing time in the form of a graph. Bulgrin does not discuss or suggest that the stored rate of heat generation is displayed with the elapsing time as a graph so that shearing heat of resin generated by the rotating screw in the metering process is able to be monitored.

Therefore, as Bulgrin does not discuss or suggest “detecting a rate of heat generation per unit time by the heater in the metering process...[and] storing the rate of heat generation by the heater with elapsing time in the metering process,” and Bulgrin does not discuss or suggest “displaying the stored rate of heat generation by the heater with the elapsing time in the metering process in a form of a graph, whereby shearing heat of resin generated by the rotating screw in the metering process is monitored,” as recited in independent claim 1, claim 1 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

Bulgrin further does not discuss or suggest “storing means for storing the rate of heat generation by the heater with position of the screw in the metering process; and display means for displaying the stored rate of heat generation by the heater with the position of the screw in the metering process in the form of a graph, whereby shearing heat of resin generated by the rotating screw in the metering process is monitored,” as recited in independent claim 4. Bulgrin merely discusses using heat transfer calculations for layers within zones to determine the heat that will be needed for the heater band to reach the operator set point temperature. Bulgrin further merely discusses an operator console screen, but does not discuss or suggest determining a position of the screw in the metering process and storing the rate of heat generation with the position of the screw. Bulgrin also does not discuss or suggest utilizing a graph in which the stored rate of heat generation by the heater during the metering process is

displayed with the position of the screw. Therefore, as Bulgrin does not discuss or suggest displaying the stored rate with the screw position, as recited in independent claim 4, claim 4 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

Bulgrin additionally does not discuss or suggest:

calculation means for calculating an average value of the rate of heat generation by the heater in the metering process [claim 15];

setting means for setting an allowable range of the rate of heat generation by the heater [claims 7, 11, and 15];

determination means for determining an abnormality of the metering process when the rate of heat generation by the heater deviates from the allowable range in the determination section [claim 7];

determining means for determining abnormality of metering if the rate of heat generation by the heater deviates from the allowable range in the determination section [claim 11];

determination means for determining an abnormality of metering if the average value of the rate of heat generation by the heater deviates from the allowable range [claim 15];

as recited in independent claims 7, 11 and 15.

As discussed above, Bulgrin does not discuss or suggest detecting a rate of heat generation and storing the rate of heat generation by the heater. Bulgrin further makes no discussion of abnormality of metering during the metering process or determining whether abnormality occurs. Bulgrin does not discuss or suggest making a determination of abnormality based on a set allowable range of the rate of heat generation by the heater that is acceptable. Bulgrin does not discuss or suggest that if the heater deviates from the allowable range of heat generation, determining that abnormality of metering or of the metering process occurs if either the stored rate or a calculated average rate of heat generation by the heater in the metering process deviates from the set allowable range. Therefore, as Bulgrin does not discuss or suggest all the features of independent claims 7, 11 and 15, claims 7, 11 and 15 patentably distinguish over the reference relied upon. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

As to claim 18, Bulgrin further does not discuss or suggest “storing the rate of heat generation by the heater with position of the screw in the metering process,” and “determining an abnormality of metering if the [calculated] average value of the rate of heat generation by the heater deviates from the [set] allowable range,” as recited in independent claim 18. As

discussed above, Bulgrin makes no such correlation between the rate of heat generation by the heater and the position of the screw during the metering process. In addition, Bulgrin does not discuss or suggest determining abnormality of metering if a calculated average value of a stored rate of heat generation by the heater deviates from a set allowable range of heat generation of the heater. Therefore, as Bulgrin does not discuss or suggest "storing the rate of heat generation by the heater with position of the screw," and does not discuss or suggest "determining an abnormality of metering if the average value of the rate of heat generation by the heater deviates from the allowable range," as recited in independent claim 18, claim 18 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

Claims 2-3, 5-6, 8-10, 12-14, 16-17 and 19-20 depend either directly or indirectly from independent claims 1, 4, 7, 11, 15 and 18 and include all the features of their respective independent claims, plus additional features that are not discussed or suggested by the reference relied upon. For example, claim 3 recites that "said detecting means detects the rate of heat generation by the heater based on electric power supplied to the heater per unit time." Therefore, claims 2-3, 5-6, 8-10, 12-14, 16-17 and 19-20 patentably distinguish over the reference relied upon for at least the reasons noted above. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

Conclusion

In accordance with the foregoing, claims 1 and 4 have been amended. Claims 1-20 are pending and under consideration.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

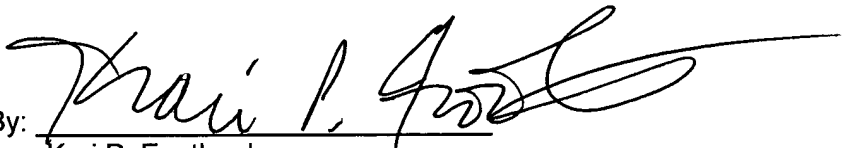
Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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Date: 8/25/06

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